Andrew GALLAGHER

Technology Centre: Irish Composites Centre (IComp)
Academic Mentor: Prof. Abhay Pandit
Commercial Partner: Boston Scientific Ltd.
Commercial Mentor: Dr. Aiden Flanagan

Andrew received his Bachelor's degree in Biotechnology at Liverpool John Moores University, UK. In 2010 he started his Master's degree in Industrial Biotechnology at Liverpool John Moores University focusing on future developments in biofuel production in collaboration with an industrial partner. He went on to work in industry for 7 years developing biopolymers for a range of different applications during which time he also completed his doctoral degree at the University of Liverpool with his thesis titled 'A Novel Peptide Hydrogel for an Antimicrobial Bandage Contact Lens'.

The Irish Composites Centre (IComp)

Prof. Abhay Pandit

Prof. Pandit is the Scientific Director of the Centre for Research in Medical Devices (Cúram) at NUI Galway. His research is funded by Science Foundation Ireland, the 7th EU Framework programme, Enterprise Ireland, Health Research Board, the AO Foundation and industry sources, which is in excess of €100 million. Prof. Pandit was elected to the American Institute of Medical and Biological Engineering (AIMBE) College of Fellows in recognition of his outstanding contributions to the creation of a national center to develop innovative device-based solutions for the treatment of global chronic diseases. He is the author of 27 patents and has published >270 papers in peer-reviewed high impact journals, >700 conference abstracts with an h-index of 59 and 13,190 citations. Prof. Pandit has successfully supervised 35 PhD students, 24 postdoctoral researchers with a current cohort of 15 Postdoctoral researchers, 20 PhD students and two research associates.

Dr. Aiden Flanagan

Dr. Flanagan is an R&D Fellow at the Boston Scientific Galway plant specialising in technology and process development. He joined BSC in 1995 as an R&D Engineer and has extensive experience innovating and developing technologies for the design and manufacture of minimally invasive medical devices. Dr. Flanagan obtained a BSc in Experimental Physics & Mathematics from National University of Ireland, Maynooth, an MSc in Optoelectronics from Queens University in Belfast, and a PhD in Experimental Physics from National University of Ireland, Galway. He holds 50 US patents on medical devices and related technologies.

The Irish Composites Centre provides world class innovative R&D, consultancy and networking opportunities for industry throughout Ireland and across all sectors with applications in composite materials and associated technologies. IComp provides the focal point in Ireland for academia and industry to work together to address some of the critical issues related to the use of composite materials.

Boston Scientific Ltd.

Boston Scientific is a medical device company with products used in a broad range of interventional medical specialties. The Galway site is an extensive manufacturing and R&D facility with over 50 leading edge manufacturing technologies and the site has expanded its capability in the last decade to include areas such as new product development, regulatory affairs, and analytical testing. It is one of the company's centres of excellence for the development of drug eluting stents and has also played a central role in developing products to treat endovascular and gastroenterological diseases.

Andrew's project

"Novel peptide based bioadhesive microparticles for targeted and controlled drug delivery"

Microparticle drug delivery systems are promising tools for the optimisation of the efficacy of drugs by prolonging their release rate and maintaining drug concentrations at the levels required. There is a clear clinical need to improve the delivery of drugs via mucosal tissue as currently in cases of ocular drug delivery <7 % of the drug is absorbed at the site of action or in the case of nasal delivery of peptides <1 % of the drug is delivered and retained in the desired region.

The main reason for this inefficiency is a short drug residence time due to clearance mechanisms. This inefficiency allows much scope to improve the delivery of drugs. This study aims to investigate novel bioadhesive microparticles composed of cross-linked poly-amino acids as a potential drug delivery system. The microparticles are composed of amino acids, the building blocks of proteins, and therefore biodegrade to molecules that are easily resorbed by the body.

The composition of the particles allows for changes to the surface properties by the addition of other biomolecules. Chemical modification of the particles would promote them to adhere to biological surfaces and aid in the controlled release of drugs to the site of action. It is envisaged that the microparticles will provide a less invasive method for the controlled and prolonged delivery of drugs whilst being non-toxic and biodegradable providing a more efficient mechanism than current drug delivery methods.

The fellowship will develop a patentable microparticle formulation that targets and controls the release of therapeutic drugs for the treatment of ocular surface disease with significant commercialisation potential.